U.S. DEPARTMENT OF ENERGY | OFFICE OF ENVIRONMENTAL MANAGEMENT

Presentation ICP-2 Industry Day Idaho Cleanup Project (ICP) Spent Nuclear Fuel Program

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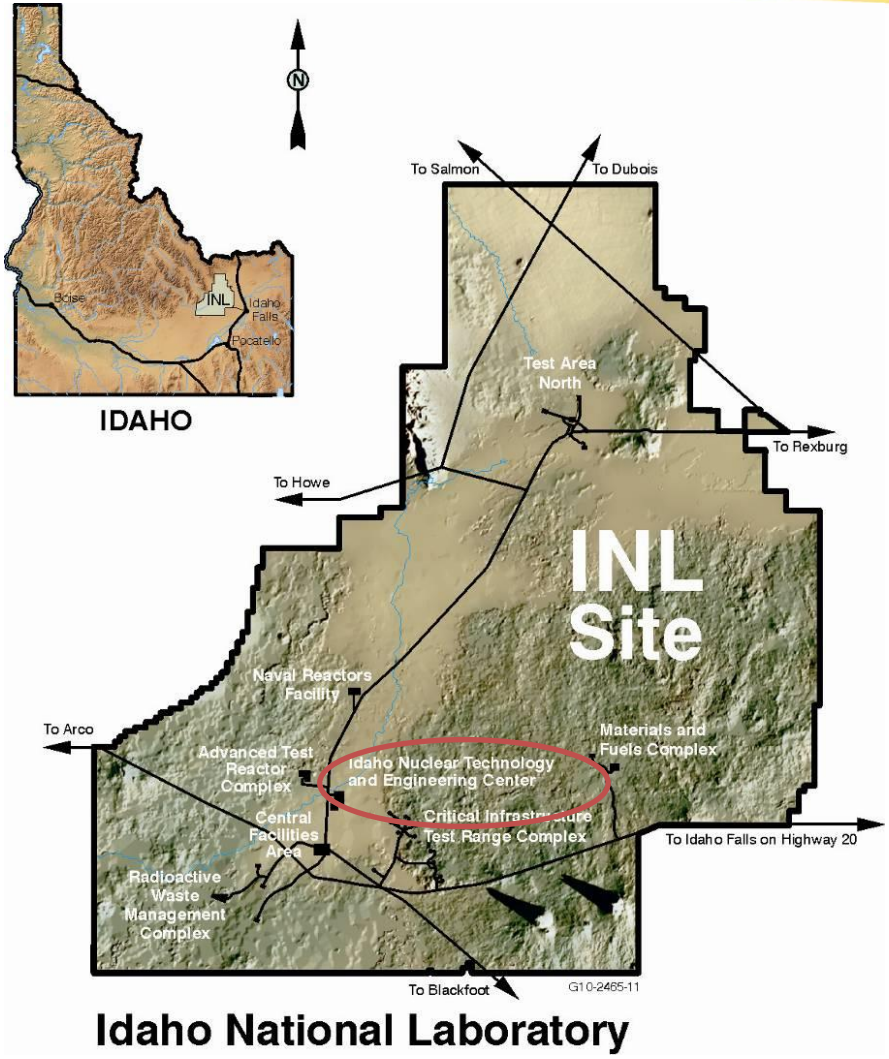
Site Map


IDAHO
Boise
INL
Idaho Falls
Pocatello
To Salmon
To Dubois
Test Area North
To Rexburg
To Howe
INL Site
Naval Reactors Facility
To Arco
Advanced Test Reactor Complex
Idaho Nuclear Technology and Engineering Center
Materials and Fuels Complex
Central Facilities Area
Critical Infrastructure Test Range Complex
To Idaho Falls on Highway 20
Radioactive Waste Management Complex
To Blackfoot
G10-2465-11
Idaho National Laboratory

Overview

- **Regulations/Drivers/Background**
- **Overview of Scope Elements**
- **Program Challenges in the Context of the Idaho Settlement Agreement**
  - **Facilities**
  - **Quantity and Types of Fuel**
  - **Fuel Disposition**
  - **Coordination with the Nuclear Energy Lab**

Regulatory Drivers

General Compliance Drivers

- Spent fuel is regulated under two distinct systems
  - Department of Energy- applicable federal laws e.g. (10 CFR 835) and DOE Orders
  - Nuclear Regulatory Commission – applicable laws e.g. (10 CFR Part 72)
    - Some DOE requirements apply to NRC regulated facilities such as 10 CFR 851
- Spent Nuclear Fuel/Used Nuclear Fuel is not declared a waste therefore non-RCRA Storage
- Idaho Nuclear Technology Center, Fuel Storage Area, CPP-666 operates in compliance with a State of Idaho Air Permit (includes NESHAPS)
- Quality Assurance – Current Condition
  - DOE/RW 0333P Quality Assurance Requirement Documents (QARD Rev. 10 for NRC licensed facilities, QARD Rev. 20 for SNF program)
  - ASME NQA-1 2008

Key State Drivers

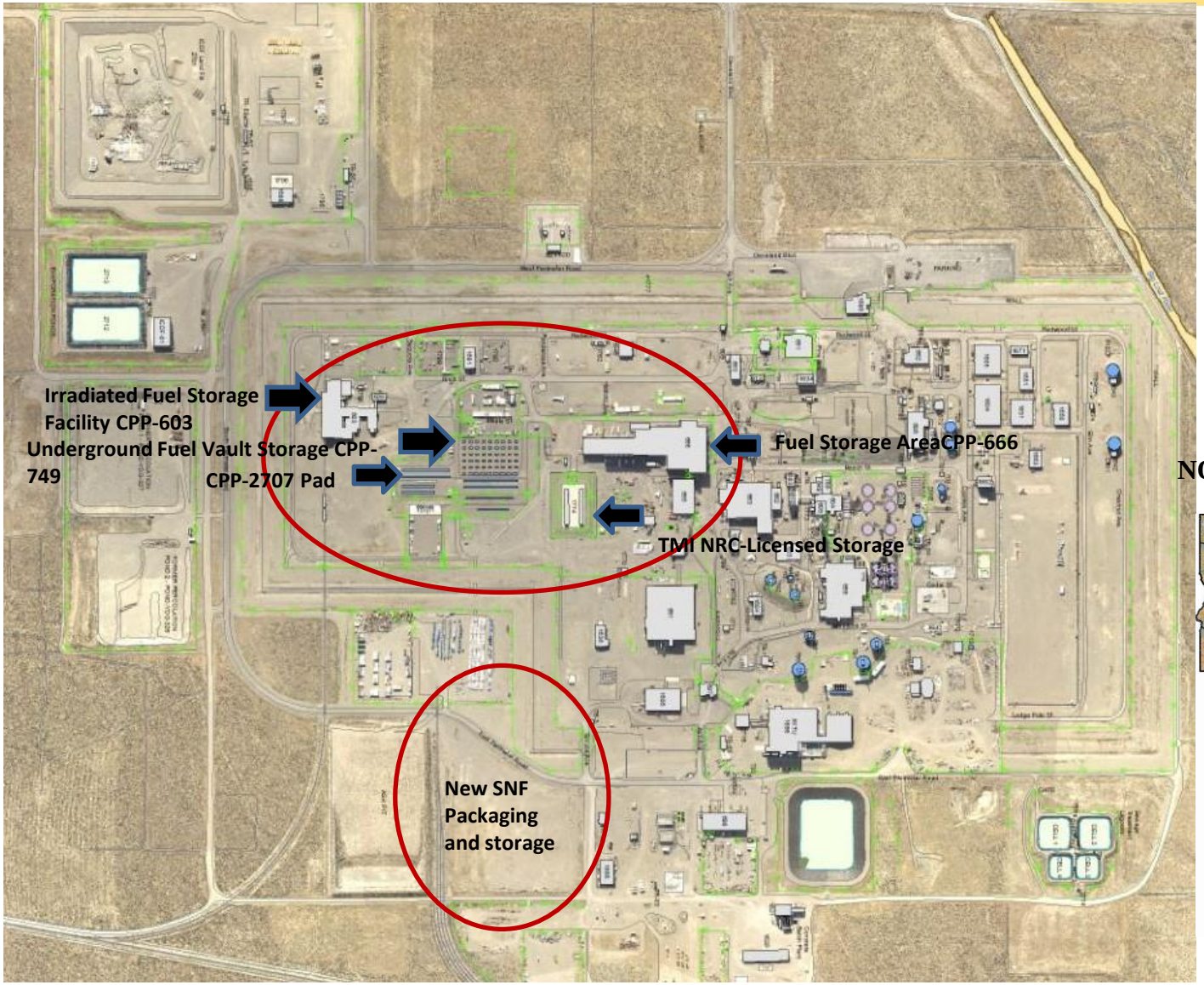
- 1995 Programmatic Spent Nuclear Fuel Management and INEL Environmental Restoration and Waste Management Programs Final Environmental Impact Statement (DOE/EIS-0203) and RODs
- **1995 Settlement Agreement**
    - E.8., "DOE shall complete the transfer of all spent fuel from wet storage facilities at INEL by December 31, 2023."
    - C.1., "DOE shall remove all spent fuel including naval spent fuel and Three Mile Island spent fuel from Idaho by January 1, 2035."
- Protection of the Snake River Plain Aquifer, designated a sole source aquifer.
- Agreement to remove all Fort Saint Vrain (FSV) fuel from the State of Colorado by 1/1/2035.
    - Idaho Settlement Agreement prevents FSV fuel from being transferred to Idaho unless a repository or interim storage facility is opened outside of Idaho and it is accepting spent fuel from this site.

Spent Fuel Facilities

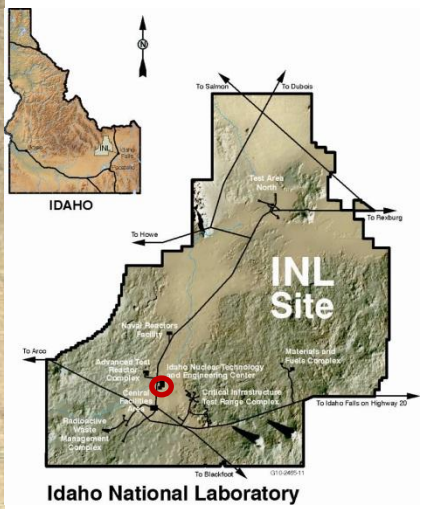
SNF is stored in 6 configurations:

- CPP-2707 –Cask Storage Pad
- CPP-749 –Underground Fuel Storage Facility
- CPP-603 –Irradiated Fuel Storage Facility
- CPP-666 –Fuel Storage Area (Basin)
- CPP-1774 –TMI-2 Independent Spent fuel Storage Installation (NRC licensed)
- Ft. St. Vrain, Independent Spent fuel Storage Installation (NRC licensed), Colorado

INTEC Site Map

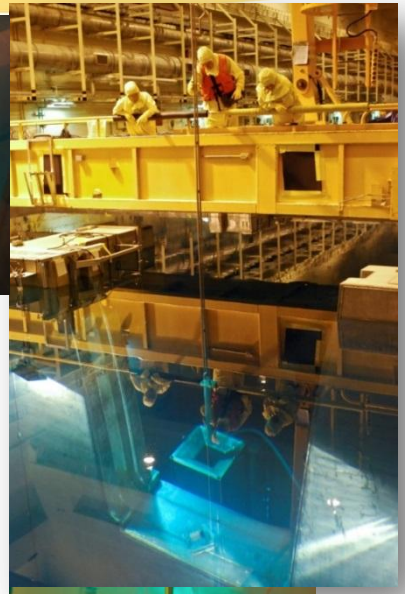


NORTH

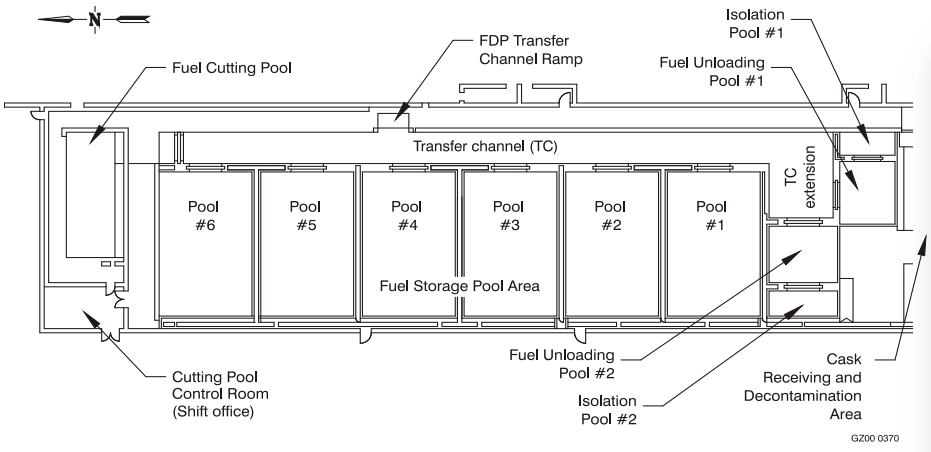


Background CPP-666 Fuel Storage Area (FSA)

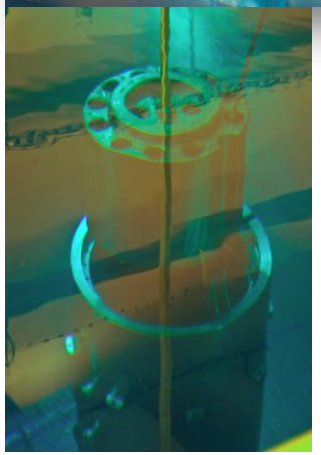
- First fuel received 1984
- Fuel storage to support processing through 1992
- Fuel storage mission since 1992
- Current Inventory, based on storage positions
  - 30% filled, 70% empty positions
  - Of the positions filled, Navy 60%, ATR 10%, EBR-II 30%
  - 2 spent fuel casks store 208 cans of miscellaneous fuel



Loading a basket in a dry storage cask



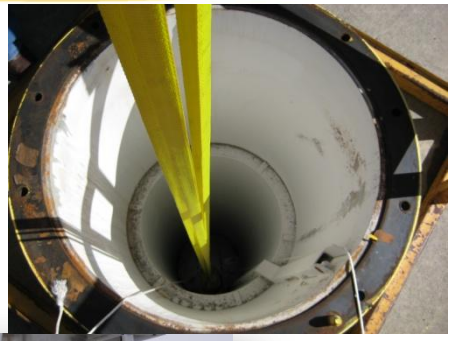
South



Loading a basket in a dry storage cask

Background CPP-749 Underground Fuel Storage Facility

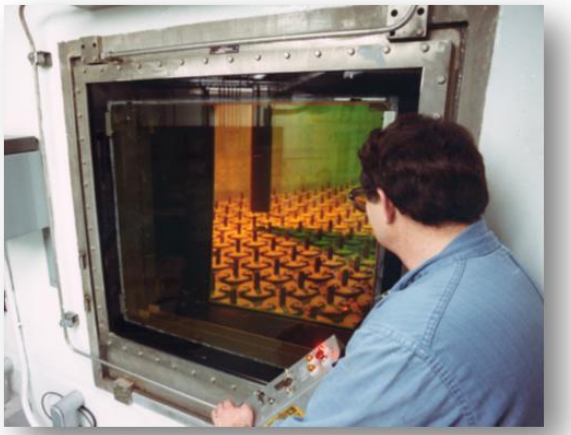
- Storage vaults, variety of diameters
  - First Generation Vaults
    - Commissioned 1970
    - 54 of 61 vaults loaded (88%)
  - Second Generation
    - Commissioned 1984
    - 74 of 157 vaults loaded (45%)
- 5 fuel types stored



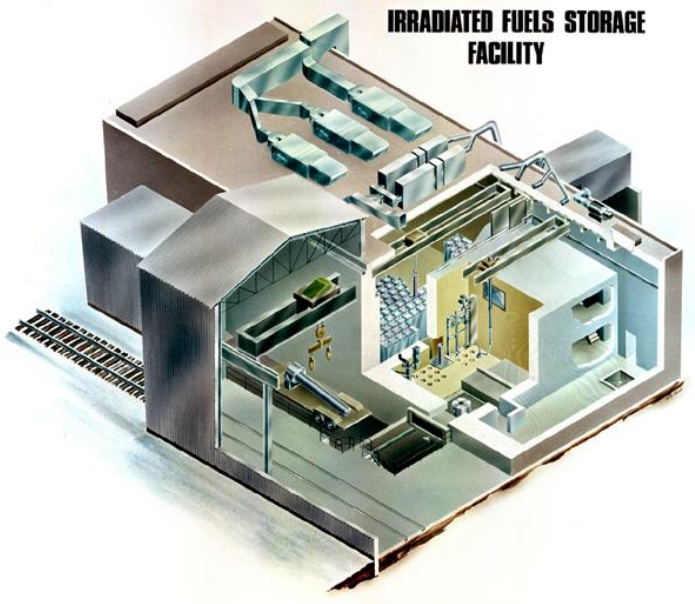
Background CPP-2707 Dry Cask Storage

- Pad commissioned Oct. 2004
- Experiments conducted for Electric Power Research Institute to support NRC technical basis for dry storage license period. (10 CFR part 72)
- 10 types of “commercial” fuel SNF
- Bolted lid cask
- West Valley rail cars
- Additional Storage space available on concrete pad.

Background CPP-603, Irradiated Fuel Storage Facility



- Commissioned 1974
  - Initially for Fort St Vrain graphite fuel
  - Shielded dry storage area
  - Shielded Cave for maintenance
  - Conditioning Station to dry fuel (repairs required)

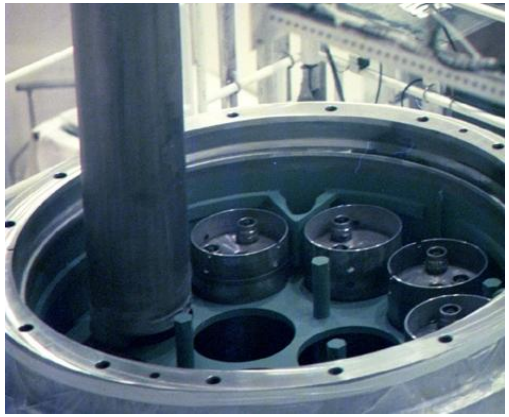


Current Inventory

- 91% capacity
- ~ 20 types of SNF/ fissile material
- Opportunity for optimization of storage array through analysis, fuel consolidation and investment in equipment modification

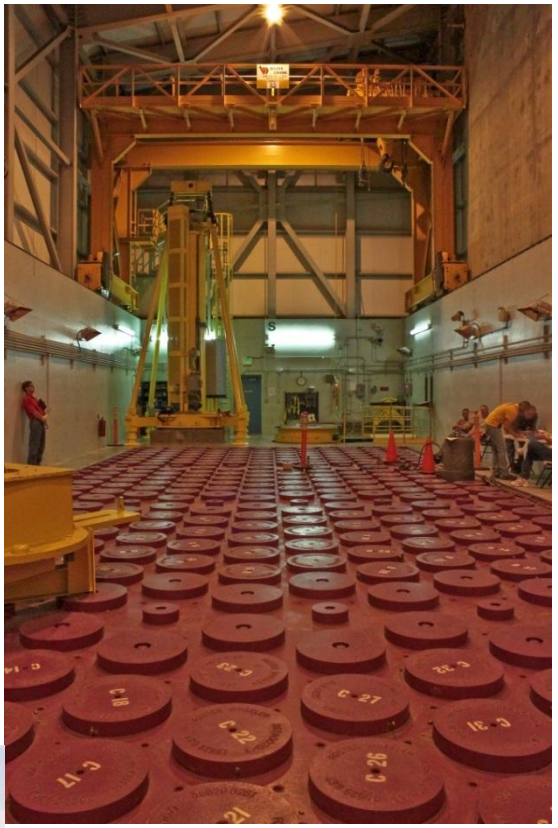
Background NRC - Three Mile Island Unit 2 (TMI-2)

- NRC License SNM-2508 for the Independent Spent Fuel Storage Installation (ISFSI) was issued March 19, 1999
- Current Inventory
  - 29 of 30 concrete Horizontal Storage Modules loaded
  - Carbon steel Dry Shielded Canisters
  - 342 TMI-2 fuel, filter and knock-out canisters
- Transportation cask was leased.



Background NRC – Fort Saint Vrain

- NRC licensed Ft. St. Vrain Independent Spent Fuel Storage Installation (ISFSI) is located in Platteville, CO
- License SNM-2504
- Constructed in 1989 by public Services of Colorado
- Licensed in 1991
- License transferred to DOE in 1999
- 20-year license renewal granted through 2031
- Stores 1,464 graphite high temperature gas cooled reactor elements in 244 fuel storage canisters.



Elements of Scope CPP-666

- **Routine Surveillance & Maintenance**
- **Experimental Breeder Reactor (EBR II) wet to dry storage**
  - Receive shipping cask, retrieve SNF from CPP-666 basin storage, load cask underwater, transfer cask to truck and prepare cask for shipment. (transportation is NE scope)
  - Material transfer approval and scheduling interface with Materials and Fuels Complex contractor.
  - 221 total shipments (will decrease if work is completed in 14 and 15).
  - Scope may change based on receipt facility throughput (processing rate) and storage capability.
  - Goal to complete transfer from wet to dry storage by 2021, two years ahead of the settlement agreement milestone, 12/31/2023.
- **Advanced Test Reactor (ATR) Fuel Receipt**
  - Receive and unload 15 shipments of ATR fuel each year through 2020.
    - 8 elements per shipment
    - ATR cask
    - Material transfer approval scheduling interface with ATR contractor.
- **Systems such as Distributed Control System, roof, basin water resin bed, HVAC may require investment**
  - Current investment decision is based on facility future use, and performance

Elements of Scope CPP-666 cont. Naval Nuclear Propulsion Program

- The scope includes tool design and fabrication, cask receipt, fuel preparation and cask loading for shipment to Naval Reactors Facility. Campaigns are scheduled to handle fuel groups with common attributes. The project is approximately 50% complete.
- FY 2016 (10/1/15 thru 9/30/16)
  - Training and Preparation for 2 campaigns to load Navy spent fuel components into dry storage sleeves
  - Load 49 dry storage sleeves with Navy spent fuel components
  - Prepare 21 Navy spent fuel components for dry storage
  - Training and Preparation for 1 campaign to load Navy spent fuel components into a shipping cask
  - Load 16 shipping casks with Navy spent fuel components and ship to NRF
- FY 2017 (10/1/16 thru 9/30/17)
  - Prepare 105 Navy spent fuel components for dry storage
  - Load 18 shipping casks with Navy spent fuel components and ship to NRF
- FY 2018 (10/1/17 thru 12/31/17)
  - Disposition records, waste and equipment

- Note: Navy work requires appropriate security clearances.

Elements of Scope CPP-603

- Routine surveillance and maintenance
- Domestic Research Reactor/Foreign RR (DRR/FRR) Receipts
- May require facility upgrades to support fuel transfer out of state. Planned retrieval beginning in 2025 (assuming 100%) fuel repackaging is required) to meet the 1/1/2035 settlement agreement milestone, all SNF out of Idaho.
- Although not in the current Environmental Liability Baseline, the 1995 DOE NEPA Record of Decision documents a fuel exchange with Savannah River Site (SRS). Aluminum clad fuel compatible with H-canyon process from Idaho for SRS fuel that cannot be processed.
- Candidate facility for new mission.

Elements of Scope CPP2707, 749

- Routine surveillance & maintenance
- Pressure & Temperature Trending
- Gas Sampling
- Fuel retrieval/cask transfer beginning after 2025
- Empty storage positions are available.

Elements of Scope NRC Licensed Facilities

- Maintain compliance with 3 NRC licenses granted under 10 CFR Part 72 for Independent Spent Fuel Storage Installations (ISFSIs):
  - SNM-2504 Fort Saint Vrain (FSV), expires 2031
  - SNM-2508 Three Mile Island (TMI) expires 2019
  - SNM-2512 Idaho Spent Fuel Facility (ISFF, not constructed) expires 2024
- Aging management program for TMI and FSV
  - Technology development
- TMI ISFSI
  - Routine surveillance & maintenance
  - Complete preparation and submit the license renewal application (LRA) by March 2017; 20-year renewal
  - Support NRC LRA review process
- FSV ISFSI
  - Contractor is the facility manager at FSV and must interface and support the security force.
  - Guard force is provided through a direct to DOE contract. If all options are exercised, the security guard contract ends on August 30, 2017.

Elements of Scope for The Capability to Transfer SNF from Idaho by 1/1/2035

- **"Project Schedule"**
  - Support CD-0/1 – 2017 through 2019
    - Develop and evaluate alternatives including alternate fuel disposition recommendations and reuse of existing facilities
    - Conceptual design report including a cost estimate and schedule
  - Design to support project baseline approval CD-2 – 2021
  - Project approved for Construction CD-3 2023

- Functions recorded in Mission Need Document Receipt of SNF from on-site facilities
- Fuel characterization (NDE), stabilization
- Packaging in DOE standardized canister
- Standardized canister storage (limited to approximately 300 positions)
- Load-out capability for both rail and truck transportation casks (casks provided by NE)

Interdependencies and Interfaces

- Interdependencies and Interfaces:
  - Nuclear Energy contractor at Advanced Test Reactor for fuel transfer to CPP-666 and or possibly CPP-603.
  - Nuclear Energy contractor at Materials and Fuels Complex (formerly ANL-W)
  - Nuclear Energy contractor Site Services (site landlord function)
  - DOE direct contract for security guard force services at Fort Saint Vrain
  - NRC, only through DOE, the NRC licensee
  - Nuclear Navy Propulsion Program (NNPP) fuel transfer in CPP-666.

Conclusion

- **Program Challenges in the Context of the Idaho Settlement Agreement**
  - **Facilities**
    - **Provide capability for fuel transfer out of Idaho. Is it necessary to construct new or could facilities be reused (CPP-666 spent fuel storage mission ends)?**
    - **Facilities are aging. What should we invest knowing they should be empty by 1/1/2035? (Risk management recommendations to DOE).**
  - **Quantity and Types of Fuel**
    - **Metric Tons Heavy Metal does not adequately describe the quantity of fuel (number of elements, variety of packages or condition) of fuel on our site. Fuel transfer handling schedule challenges.**
  - **Fuel Disposition**
    - **Immediate requirement is to comply with the Settlement Agreement milestone to have all SNF in dry storage by 1/31/2023 or sooner i.e. 2021.**
    - **EBR II relies on processing rate at MFC, funding, equipment etc. What are the options?**
    - **Dry storage of ATR fuel in CPP-603 may be attractive to the Nuclear Energy Program as a storage alternative. (May or may not be in RFP)**
    - **Support to NE and the Lab. Potential added scope.**